

CLAIMS

1. An encapsulated stator assembly for use in a stator-driven device, comprising:

a stator having a core and a plurality of windings; and

a covering portion that forms at least a partial covering over the stator, the covering portion including an outer surface that compressively engages with a portion of the stator-driven device to secure the stator in the stator-driven device.

2. An encapsulated stator assembly as defined in claim 1, wherein the encapsulated stator assembly is pre-formed before insertion into the stator-driven device.

3. An encapsulated stator assembly as defined in claim 1, wherein the stator-driven device is an x-ray tube.

4. An encapsulated stator assembly as defined in claim 1, wherein the covering portion forms a covering over the entirety of the stator.

5. An encapsulated stator assembly as defined in claim 1, wherein the covering portion is thermally conductive.

6. An encapsulated stator assembly as defined in claim 1, wherein the covering portion is made from a resilient material.

7. An encapsulated stator assembly as defined in claim 1, wherein the covering portion fixes the windings such that the windings are unable to vibrate during operation of the stator-driven device.

8. An encapsulated stator assembly as defined in claim 1, wherein the covering portion further includes an x-ray absorptive material.

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9. An x-ray tube, comprising:
 - an outer housing containing an evacuated enclosure;
 - an electron source and a rotary anode located within the evacuated enclosure;
 - a rotor assembly that is rotatably attached to the rotary anode;
 - an encapsulated stator assembly, comprising:
 - a stator that is positioned about the rotor assembly, the stator being substantially enveloped by a covering portion that is configured to secure the stator within the outer housing.
10. An x-ray tube as defined in claim 9, wherein the covering portion forms a resilient outer surface that compressively engages a surface of the outer housing.
11. An x-ray tube as defined in claim 9, wherein the covering portion dissipates heat produced by the stator during operation of the x-ray tube.
12. An x-ray tube as defined in claim 9, wherein the covering portion prevents contaminants from entering the stator.
13. An x-ray tube as defined in claim 9, wherein the covering portion is made from a silicone-based product.
14. An x-ray tube as defined in claim 9, wherein the encapsulated stator assembly includes a central cylindrical cavity that receives a portion of the evacuated enclosure.

15. An x-ray tube as defined in claim 9, wherein the covering portion further comprises:

an outer surface having at least two annular channels defined in the outer surface; and

an O-ring positioned in each channel, each O-ring being compressively interposed between the respective channel and an inner surface of the outer housing.

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16. A method of making an encapsulated stator assembly, comprising:

placing a stator in a cavity of a mold;

placing a resilient material in the cavity such that the resilient material substantially covers the stator; and

curing the resilient material such that the resilient material adheres to the stator.

17. A method of making an encapsulated stator assembly as defined in claim 16, further comprising:

after the stator is placed in the cavity, adjusting the height of the stator in the cavity.

18. A method of making an encapsulated stator assembly as defined in claim 16, wherein placing a resilient material in the cavity further comprises:

pouring a flowable resilient material into the cavity.

19. A method of making an encapsulated stator assembly as defined in claim 16, further comprising:

after the resilient material is placed in the cavity, placing the mold in a vacuum environment to remove air from the resilient material.

20. A method of making an encapsulated stator assembly as defined in claim 16, wherein curing the resilient material further comprises:

curing the resilient material by placing the mold in a heated environment for a predetermined amount of time.

21. A method of making an encapsulated stator assembly as defined in claim 16, wherein the mold comprises a bowl having a central pillar.

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22. An x-ray tube, comprising:

an outer housing;

an evacuated enclosure contained in the outer housing, the evacuated enclosure containing an electron source and a rotary anode having a target surface that is positioned to receive electrons produced by the electron source, the rotary anode being supported by a rotor assembly; and

an encapsulated stator assembly, comprising:

a stator having a core and a plurality of windings attached to the core;

and

a resilient covering portion that envelops the stator, wherein the resilient covering portion defines an outer surface that compressively engages an inner surface of the outer housing to secure the stator in a fixed position about the rotor assembly.

23. An x-ray tube as defined in claim 22, wherein the encapsulated stator assembly is pre-formed before being placed in the outer housing.

24. An x-ray tube as defined in claim 23, wherein the compressive engagement between the outer surface of the encapsulated stator assembly and the outer housing provides sufficient contact pressure to facilitate heat transfer from the stator to the outer housing.

25. An x-ray tube as defined in claim 24, wherein the covering portion comprises a dielectric and thermally conductive material such that the covering material removes heat from the stator during operation of the x-ray tube.

26. An x-ray tube as defined in claim 25, wherein the covering portion comprises a silicone adhesive material.

27. An x-ray tube as defined in claim 26, wherein the encapsulated stator assembly further includes an x-ray shielding component.

28. An x-ray tube as defined in claim 27, wherein the x-ray shielding component comprises an x-ray absorbing powder that is integrated into the material that forms the covering portion.

29. An x-ray tube as defined in claim 27, wherein the x-ray shielding component comprises x-ray absorptive plating that is attached to a portion of the encapsulated stator assembly.